

OPTICAL DISK DEVICE AND ITS CONTROL METHOD

Publication number: JP2002183974 (A)

Publication date: 2002-06-28

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Classification:

- international: G11B20/10; G11B7/0055; G11B7/006; G11B7/007; G11B20/12; G11B20/10; G11B7/00; G11B7/007; G11B20/12; (IPC1-7): G11B7/006; G11B7/0055; G11B7/007; G11B20/10; G11B20/12

- European:

Application number: JP20000383137 20001212

Priority number(s): JP20000383137 20001212

Abstract of JP 2002183974 (A)

PROBLEM TO BE SOLVED: To provide an optical disk device that enables packet write even on an optical disk for a process such as 'minimally blank' and to provide the control method for this device.

SOLUTION: This device records, on a prescribed recoding means, the positional information of a position for starting the recording of a following block and holds the information. In addition, as a precondition of such a process, if an erasing process in which the record of a data region is defined as erased by the erasure of the data in the control region, is executed, a prescribed identifying information is set to start a writing process.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention is especially applicable to the rewritable optical disc of CD-RW (CD-Rewritable) etc. about the control method of an optical disk unit and an optical disk unit. In this invention, the position information on the recording start position of the continuing block is recorded on a predetermined recording device, and is held.

therefore, when erasing processing to which it is supposed as a premise of such processing that record of the data area was eliminated by elimination of the data of a management domain is performed. Even if it is an optical disc applied to processing of a minima reeve rank etc. by setting up predetermined identification information and starting processing of writing by this identification information, it enables it to carry out packet writing etc.

[0002]

[Description of the Prior Art] Conventionally, in the optical disk unit, the postscript of data is repeated with a packet writing method, and it is made as [secure / use it as memory storage, such as a computer, by this, and / the same user-friendliness as a hard disk drive etc.].

[0003] That is, in packet writing, the data to record is divided in predetermined data volume, and is packet-ized, this packet is made into a unit, and data is added to an optical disc. At this time, in packet writing, the end of a recorded field is detected from an optical disc, and each packet is added one by one from this end.

[0004] Thus, in CD-RW which is an optical disc rewritable among the optical discs which record desired data with packet writing, A recorded optical disc is initialized by blank processing, and it is made as [use / it / as an optical disc in which data is not recorded at all].

[0005] That is, as shown in drawing 6 (A), in the optical disc of CD-RW, the field of PMA (Program Memory Area) is set to the inner circumference side. The management information in which PMA manages the index of this optical disc and a track is recorded here. Then, TOC (Table Of Content) whose optical disc is the administrative information on a data area is recorded on the periphery side,

and the continuing periphery side is set as a data area. When based on packet writing, data is recorded by a packet unit one by one from the inner circumference side of this data area. in addition - - it is in this drawing 6 ---less -- carrying out -- the state and the state where it is eliminated where data is recorded, respectively are shown.

[0006]In processing blank about the optical disc concerning such composition, As shown in drawing 6 (B), there was the method (full blank (Full Blank)) of irradiating the periphery side and the whole surface with a laser beam from PMA and read in area, and eliminating recorded data thoroughly, and when it was this method, there was a fault which processing takes time.

[0007]On the other hand, in this blank processing, There is also processing called what is called a minima reeve rank, and in this processing, as shown in drawing 6 (C), PMA and read in area are irradiated with a laser beam, and it is made as [initialize / to set only these fields as the state where it does not record, selectively / an optical disc]. In processing of this minima reeve rank, time which processing takes can be made markedly short on a target as compared with the case where it is based on a full blank.

[0008]When data is recorded with packet writing in the optical disc of CD-RW, When processing of initialization is performed by processing of the full blank which eliminates the recorded data among these blank processings thoroughly and this adds a packet, as shown in drawing 6 (D), it is made as [add / the part which is not recorded following a recorded field is detected and / a packet].

[0009]

[Problem(s) to be Solved by the Invention]By the way, if blank processing can be performed by a minima reeve rank even if it is a case where data is recorded with packet writing, It is thought by the ability to make markedly short on a target that part and time which blank processing takes that the user-friendliness of this kind of optical disc can be improved as compared with the former.

[0010]However, in the optical disc by processing of a minima reeve rank, As shown in drawing 6 (E), when being based on packet writing by eliminating the recorded data of a data area by overwrite, It became difficult to detect the position of the end of the field which is a continuing write-in starting position and which records data effectively, and there was a problem in which it is difficult to use it about the optical disc by a minima reeve rank after all.

[0011]When a certain data incidentally exists in the head (immediately after TDB (Track Descriptor Brock)) of a data area with the conventional optical disk unit at the time of a packet writing start, It judges with the optical disc by processing of a minima reeve rank, and is made as [use / data / eliminating thoroughly by a full blank].

[0012]On the other hand, although how to make detectable the position of the end of such a field that records data effectively can usually be considered by record of TOC, PMA, etc. like an optical disc as one method of solving this problem, In [again] packet writing in CD-RW, when a recording rate has restriction, By applying to packet writing by repeating record frequently, by record of TOC, PMA, etc., if the position of the end of such a field that records data effectively is made detectable, it will become difficult to use an optical disc in very short time.

[0013]This invention was made in consideration of the above point, and even if it is an optical disc

concerning processing of a minima reeve rank etc., it tends to propose the control method of an optical disk unit and an optical disk unit which can do the packet-writing.

[0014]

[Means for Solving the Problem]In [in order to solve this technical problem] an invention of claim 1, It applies to an optical disk unit which accesses a rewritable optical disc, A block which continues from a previous recording start position on the basis of position information which recorded position information on a recording start position of a continuing block on a predetermined recording device, and was recorded on this recording device is recorded, and position information recorded on a recording device is updated.

[0015]In an invention of claim 8, apply a rewritable optical disc to an optical disk unit to access, and by elimination of data of a management domain. When erasing processing to which it is supposed that record of a data area was eliminated is performed, In a part which sets up predetermined identification information and to which recorded data [head / of a data area] exists in processing of writing based on this identification information, Record desired data by a predetermined block unit, and record position information on a recording start position of a continuing block on a predetermined recording device, eliminating recorded data by overwrite, and. Setting out of identification information is updated, a block which continues from a previous recording start position on the basis of position information recorded on a recording device is recorded, and position information recorded on a recording device is updated.

[0016]In an invention of claim 20, it applies to a control method of an optical disk unit, A block which continues from a previous recording start position on the basis of position information which recorded position information on a recording start position of a continuing block on a predetermined recording device, and was recorded on this predetermined recording device is recorded, and position information recorded on a recording device is updated.

[0017]When erasing processing to which is applied to a control method of an optical disk unit, and it is supposed in an invention of claim 21 that record of a data area was eliminated by elimination of data of a management domain is performed, In a part which sets up predetermined identification information and to which recorded data [head / of a data area] exists in processing of writing based on this identification information, Record desired data by a predetermined block unit, and record position information on a recording start position of a continuing block on a predetermined recording device, eliminating recorded data by overwrite, and. Setting out of identification information is updated, a block which continues from a recording start position on the basis of position information recorded on a recording device is recorded, and position information recorded on a recording device is updated.

[0018]According to composition of claim 1, record a block which continues from a previous recording start position on the basis of position information which recorded position information on a recording start position of a continuing block on a predetermined recording device, and was recorded on this recording device, and. Even when recording data on a data area by overwrite by updating position information recorded on a recording device, A recording start position of a block which continues by

position information recorded on this recording device can be detected and recorded, and the packet-writing can be done even if it is an optical disc concerning processing of a minima reeve rank etc. in which uneliminated data remains in a user area by this.

[0019]When erasing processing to which it is supposed by elimination of data of a management domain that record of a data area was eliminated is performed according to composition of claim 8, Even if it is an optical disc concerning processing of a minima reeve rank etc. in which uneliminated data remains in a user area by setting up predetermined identification information, a thing with this effective remaining data and a thing it should be considered that is what was eliminated can be judged by identification information. In a part to which recorded data [head / of a data area] exists based on this identification information by this, processing of packet writing etc. can be correctly started by recording desired data by a predetermined block unit, eliminating recorded data by overwrite. Record position information on a recording start position of a block which continues at this time on a predetermined recording device, and. Record a block which continues from a previous recording start position on the basis of position information which updated setting out of identification information and was recorded on this recording device, and. Even when recording data on a data area by overwrite by updating position information recorded on a recording device, A recording start position of a block which continues by position information recorded on this recording device can be detected and recorded, and the packet-writing can be done even if it is an optical disc concerning processing of a minima reeve rank etc. in which uneliminated data remains in a user area by this.

[0020]Even if it is an optical disc which is applied to processing of a minima reeve rank etc. by these according to composition of claim 20 or claim 21, a control method of an optical disk unit which can do the packet-writing can be obtained.

[0021]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is explained in full detail, referring to drawings suitably.

[0022](1) The lineblock diagram 2 of a 1st embodiment [1st] of an embodiment (1-1) is a block diagram showing the optical disk unit concerning a 1st embodiment of this invention. This optical disk unit 1 accesses the optical disc 3 by control of the host computer 2. The optical disc 3 of the accessing object in this optical disk unit 1 is CD, CD-ROM, CD-R, CD-RW, etc. which recorded the audio signal which is the so-called family of CD.

[0023]That is, in this optical disk unit 1, the spindle motor 4 rotates the optical disc 3 with predetermined revolving speed by the drive of the spindle driver 6 by control of the servo control circuit 5. The spindle driver 6 is a driver which drives the spindle motor 4 here. The thread motor 7 moves the optical pickup 9 to the radial direction of the optical disc 3 by the drive of the thread driver 8 by control of the servo control circuit 5. The thread driver 8 is a driver which drives the thread motor 7 here.

[0024]From a built-in semiconductor laser, the optical pickup 9 emits a laser beam and irradiates the information storage side of the optical disc 3 with this laser beam via an object lens. The returned light obtained by the exposure of this laser beam is received with a predetermined photo detector via

an object lens. After the optical pickup 9 carries out the current potential conversion process of the light-receiving result of this photo detector, Matrix operation processing is carried out, By this. The servo error signal S1 by the focus error signal with which a signal level changes according to the tracking error signal and focus error amount from which a signal level changes according to the amount of tracking errors, The push pull signal S2 with which a signal level changes according to meandering of the groove formed in the optical disc 3, the regenerative signal with which a signal level changes according to the existence of a pit, etc. are generated and outputted.

[0025]Such a laser beam and the object lens with which processing of returned light is presented are held at a dual shaft actuator, and the optical pickup 9 is made as [drive / with the dual shaft actuator driver 10 by control of the servo control circuit 5 / the dual shaft actuator here]. The dual shaft actuator driver 10 is a driver which drives a dual shaft actuator here. thereby -- the optical pickup 9 -- tracking control -- and it is made as [carry out / focus control].

[0026]Furthermore, the optical pickup 9 starts the light volume of the laser beam with which the optical disc 3 is irradiated to predetermined timing, It is made as [eliminate / the data which formed the pit sequence in the optical disc 3 by this, recorded desired data, eliminated the pit sequence further formed in the optical disc 3, and was recorded on the optical disc].

[0027]The RFAMP section 12 amplifies the output signal of the optical pickup 9 by a predetermined profit, and outputs it. Namely, the RFAMP section 12 amplifies the servo error signal S1, outputs it to the servo control circuit 5, and amplifies the push pull signal S2, and outputs it to ATIP decoder 13. On the other hand, about a regenerative signal, it amplifies and binary-izes on a predetermined profit, and the binary-ized signal S3 acquired as a result is outputted to the decoder section 14. further -- the RFAMP section 12 -- these processings -- in addition, by judging the signal level of a regenerative signal with a predetermined threshold, the discrimination signal which distinguishes the kind of optical disc 3 on the basis of the reflectance of the optical disc 3 is generated, and this discrimination signal is outputted to the central processing unit (CPU) 15. By the judgment of the same amplitude of a regenerative signal, detecting-signal S4 which detects a non-record section by the existence of a pit sequence is generated, and it outputs to the central processing unit 15. Thereby with this optical disk unit 1, it is made as [detect / this detecting-signal S4 / with the central processing unit 15 / the non-record section of the optical disc 3].

[0028]By the RFAMP section's 12 having a drive circuit of a semiconductor laser, and driving a semiconductor laser on the basis of a predetermined signal level by this drive circuit, corresponding to the output data D2 of the encoder part 23, The light volume of the laser beam outputted from the optical pickup 9 is started at the time of elimination at the time of writing.

[0029]ATIP decoder 13 by decoding the push pull signal S2 acquired from the RFAMP section 12, The absolute time information (ATIP:Absolute Time In Pre-Groove) which is the position information recorded on the optical disc 3 by meandering of the groove is detected, and it outputs to the central processing unit 15. Thereby with this optical disk unit 1, it is made as [acquire / with the central processing unit 15 / the position information on a laser-beam-irradiation position].

[0030]When such absolute time information is undetectable, ATIP decoder 13 outputs a

discrimination signal to that effect, and enables it to distinguish the kind of optical disc 3 also with this discrimination signal in the central processing unit 15 by this. . Furthermore, do ATIP decoder 13 for a built-in PLL circuit to generate a clock and to process the push pull signal S2, when performing these processings. Thereby, with the optical disk unit 1, when data is not recorded on the optical disc 3 at all, it is made as [operate / on the basis of this clock].

[0031]The servo control circuit 5 receives the servo error signal S1 acquired from the optical pickup 9 via the RFAMP section 12, and it controls operation of the dual shaft actuator driver 10 so that this servo error signal S1 is set to a predetermined signal level. this forms a servo loop in this optical disk unit 1 -- tracking control -- and it is made as [carry out / focus control].

[0032]The servo control circuit 5 controls operation of the thread driver 8 by control of the central processing unit 15 on the basis of the position information acquired from ATIP decoder 13, and makes the part directed with the central processing unit 15 by this seek the optical pickup 9 furthermore. The servo control circuit 5 controls operation of the spindle driver 6 by control of the central processing unit 15 on the basis of the position information acquired from same ATIP decoder 13, and, thereby, rotates the optical disc 3 with predetermined revolving speed.

[0033]The decoder section 14 plays the data which carried out signal processing of the binary-ized signal S3 outputted from the RFAMP section 12, and was recorded on the optical disc 3. Namely, in the decoder section 14 the PLL (Phase Locked Loop) circuit 16, Generate a clock on the basis of the binary-ized signal S3, and the SYNC detector circuit 17, An alignment pattern is detected from this serial data stream by latching the binary-ized signal S3 one by one on the basis of this clock, generating a serial data stream, and comparing these serial data with a predetermined pattern.

[0034]On the basis of the timing of this alignment pattern detection, the EFM (eight to fourteen Modulation) demodulator circuit 18 incorporates a serial data stream, carries out an EFM recovery, and outputs the demodulated data which is that processing result. CIRC(Cross Interleave Reed-Solomon)19, this decode data -- DEINTA reeve processing -- it outputs and layered [error correction processing is carried out, and] -- the ECC circuit (Error Correcting Code) 20 carries out error correction processing of this output data further.

[0035]It is made as [play / the user data which the decoder section 14 carried out signal processing of the output signal of the optical pickup 9 by these processings, and was recorded on the optical disc 3]. In this the processing of a series of, the decoder section 14 incorporates output DEDA of the EFM demodulator circuit 18 to predetermined timing, processes it selectively, acquires the sub-code recorded on the optical disc 3 by this, and notifies this sub-code to the central processing unit 15. It is made as [set / here / in this sub-code / the code which shows a logical erasing state (it is what is called logic elimination)], and, thereby, is made in the central processing unit 15 as [detect / it / about the part of logic elimination by this sub-code]. Incidentally, the state of logic elimination is performed by setting out in the mode 0. By same processing, the decoder section 14 reproduces the data of the data of TOC, PMA, etc., and outputs it to the central processing unit 15.

[0036]In the decoder section 14, processing is switched according to the optical disc 3 by control of the central processing unit 15, Or stop processing by a part and, in the case of the compact disk

which recorded the audio signal, the optical disc 3 carries out the direct output of the user data obtained from the CIRC decoder 19 to the continuing interface 22 by this, It is made as [perform / processing corresponding to the optical disc 3].

[0037]The interface (I/F) 22 is an interface with a host device, and notifies the various commands outputted from the host computer 2 to the central processing unit 15. The response to the notice of this command is received from the central processing unit 15, and this response is outputted to the host computer 2. The interface 22 receives the user data D4 played from the optical disc 3 from the decoder section 14, and outputs it to the host computer 2. Contrary to this, the user data D1 outputted from the host computer 2 is received, and it outputs to the encoder part 23. The interface 22 performs radial transfer of these user data D1 and D4 via the buffer memory 24.

[0038]The encoder part 23 processes the user data D1 which does in this way and is obtained from the interface 22 by predetermined format, and outputs the output data D2. That is, in the encoder part 23, layered ECC circuit 25 blocks user data one by one per prescribed data, and adds and outputs an error correcting code to each block. The CIRC encoder 26 adds an error correcting code to the output data of this layered ECC circuit 25, carries out interleave processing further and outputs. The eight-to-fourteen modulation circuit 27 carries out eight-to-fourteen modulation of the output data of this CIRC encoder 26. The encoder part 23 inserts an alignment pattern in the output data of this eight-to-fourteen modulation circuit 27 to predetermined timing, and outputs these processing results by a serial data stream. The encoder part 23 is made as [respond / the processing in layered ECC circuit 25, etc. are switched, and / by control of the central processing unit 15, / to the format of the various optical discs 3 / it / by this]. In the optical disk unit 1, it is made as [record / the optical pickup 9 is driven with the output data D2 of the encoder part 23 produced by doing in this way, and / desired data].

[0039]In these processings, the encoder part 23 carries out coding processing of the sub-code which replaces with user data to predetermined timing, and is outputted from the central processing unit 15, and generates the output data D2. Thereby with this optical disk unit 1, it is made as [perform / not only by elimination of the physical data based on irradiating with a laser beam and eliminating a pit sequence but by setting out of this sub-code / processing of logic elimination].

[0040]The memory 30 records and holds the data of the disks ID and TOC of the optical disc 3 obtained from the decoder section 14, etc. by control of the central processing unit 15.

[0041]The central processing unit 15 is a control circuit which controls operation of this optical disk unit 1 whole, if charge of the optical disc 3 is detected by the detecting mechanism which is not illustrated, will control operation of the servo control circuit 5, and will start rotation of the optical disc 3. Furthermore, the central processing unit 15 makes read in area and PMA the inner circumference side of the optical disc 3 seek the optical pickup 9, and acquires various kinds of information acquired from these fields. These information is PMA, TOC, and the various discrimination signals mentioned above here. The central processing unit 15 distinguishes the kind of optical disc 3 by these, and information required for access of the optical disc 3 is developed and held in the memory 30.

[0042]When the optical disc 3 is CD-RW, in these processings the central processing unit 15, The

optical pickup 9 is made to seek to the periphery side of read out area, the existence of the identification code or the special pattern in which it is shown that it is an optical disc concerning the processing of a minima reeve rank mentioned later is detected, and a detection result is recorded on the memory 30. Based on the sub-code outputted from discrimination signal S4 and the decoder section 14 which are outputted from the RFAMP section 12, The existence of PMA, physical elimination of read in area, and logic elimination and the end of the user data further recorded on the user area are detected, and from these detection results, the state of the optical disc 3 is detected and it records on the memory 30.

[0043]The information on the kind of optical disc 3 which carried out the central processing unit 15 in this way by the demand from the host computer 2, and was detected at the time of charge of the optical disc 3, The information on a state, etc. are notified to the host computer 2, and, thereby, it is made as [perform / processing according to the kind of optical disc 3 and a state] in the host computer 2.

[0044]That is, if there is the optical disc 3 with which it was loaded in the case of the compact disk which recorded the audio signal, in the host computer 2, playback of an automatic compact disk is directed, for example by a user's setting out by the notice of such information. In this case, the central processing unit 15 accesses TOC recorded on the memory 30 according to these directions, and directs playback of the optical disc 3. When the identification code or the special pattern mentioned above is detected, it notifies and the availability of the optical disc 3 is notified as the purport that it is an optical disc concerning processing of a minima reeve rank, and a thing by which data is not recorded at all on this optical disc 3. On the other hand, it is a case where the identification code or the special pattern mentioned above is not detected, and when PMA and TOC are eliminated, the part concerning argument value elimination more nearly physical than the head of a user area or is detected, and the position information on this detected position notifies an availability and used capacity.

[0045]In these processings, the central processing unit 15, When it is a case where the optical disc 3 is CD-RW and the command of a full blank is inputted from the host computer 2, by control of the servo control circuit 5. As mentioned above about drawing 6 (A) and (B), PMA, TOC, and all the recorded data are eliminated and processing of a full blank is performed. At this time, the central processing unit 15 eliminates user data by elimination of the physical pit sequence mentioned above with directions of the host computer 2, or logic elimination.

[0046]By control of servo control circuit 5 grade, if the command of a minima reeve rank is similarly inputted when the optical disc 3 is CD-RW, as shown in drawing 1 (A) and (B), the central processing unit 15 will eliminate PMA and TOC, and will perform processing of a minima reeve rank. Thereby, the central processing unit 15 performs processing of a minima reeve rank by the same control as usual.

[0047]Furthermore, the central processing unit 15 makes the outside of read out area seek the optical pickup 9, and records the identification code or the special pattern in which it is shown that it is an optical disc concerning processing of a minima reeve rank on the field of this seeking place. It is

made as [check / using the information recorded on the outside of this read out area / what has the effective data recorded on the data area by these in the optical disk unit 1, and the thing which should be dealt with as eliminated data].

[0048]Thereby, the central processing unit 15 records user data from the head of a data area in the packet writing immediately after minima reeve rank processing about the optical disc 3 in which it comes to record such an identification code or a special pattern. After doing still in this way and recording user data, record of such an identification code or a special pattern is eliminated.

[0049]That is, drawing 3 is a flow chart which shows the procedure of the central processing unit 15 when directions of the writing by packet writing are inputted from the host computer 2, when the optical disc 3 is CD-RW. That is, if a command is inputted, the central processing unit 15 will move to step SP2 from step SP1, and will acquire information required for the judgment of being the optical disc 3 which accesses the memory 30 here and is applied to processing of the minima reeve rank in this optical disk unit 1. This information is the existence of record of an identification code or a special pattern here.

[0050]Furthermore in step SP3 continuing, the central processing unit 15 judges whether it is the optical disc 3 applied to processing of the minima reeve rank by this optical disk unit 1 using this acquired information. By being what requires this optical disc 3 for the minima reeve rank processing of this optical disk unit 1, when an identification code or a special pattern is detected by the periphery side of read out area here, An affirmation result is obtained by step SP3 and the central processing unit 15 moves to step SP4.

[0051]The central processing unit 15 judges the write-in starting position of data here. By being held here as the identification code or the special pattern was recorded in this case, the minima reeve rank of the optical disc 3 is carried out, and data is not recorded on a data area at all. Thereby, the central processing unit 15 sets the head of a data area as a recording start position.

[0052]Thus, if a recording start position is set up, the central processing unit 15 will move to step SP5, and will record user data with packet writing from this recording start position. Furthermore, in this case, the central processing unit 15 controls operation of the servo control circuit 5 to eliminate the identification code or the special pattern in which processing of a minima reeve rank is shown at the periphery side of read in area, as mentioned above.

[0053]Thus, in step SP6 continuing, if a packet is recorded, as shown in drawing 1 (C), the central processing unit 15 will record the marker M in which the writing position of the continuing data is shown on the continuing recording start position, and will record the recording start position which continues by this on the optical disc 3.

[0054]In this marker M, it is set as an information storage side here by eliminating physically the data of a predetermined region (for example, ten frames) by logic elimination from the recording start position of the continuing packet. It is made as [detect / even when recording user data by overwrite / in subsequent packet writing, / with the optical disk unit 1, / by setting out of this marker M / a recording start position].

[0055]Thus, if the marker M in which the writing position of the continuing data is shown is recorded,

the central processing unit 15 will move to step SP7, and will end this procedure.

[0056]On the other hand, if a negative result is obtained by step SP3, the central processing unit 15 will move to step SP8 from step SP3. When a negative result is obtained by step SP3 in this way here, It is which [of what this optical disc 3 depends on processing of a full blank, the thing by which blank processing is not yet performed, or the thing from which the identification code or the special pattern was eliminated by execution of the procedure of step SP1-SP2-SP3-SP4-SP5-SP6-SP7] case. In these optical discs 3, the field which the non-record section has been arranged or was eliminated physically and logically by the end of effective user data in any case will be formed.

[0057]In [in this case] step SP8 by this the central processing unit 15, From the reproduction result which points to the search of a data area to the servo control circuit 5, and is obtained from the decoder section 14. The head of the field (field concerning the field or logic elimination from which it comes to eliminate data physically) where data is not recorded effectively is detected from decision signal S4 by the regenerative signal detected in the RFAMP section 12. Thereby, the central processing unit 15 detects the end of the data recorded on the data area about the optical disc concerning a full blank, and the optical disc in which blank processing is not yet performed. The recording start position of the marker M is detected about the optical disc 3 which records the marker M mentioned above.

[0058]The central processing unit 15 sets the position which was carried out in this way and detected as a recording start position, and records the data inputted one by one by packet writing from the host computer 2 in step SP5 continuing. After recording the marker M anew by step SP6 which furthermore continues, it moves to step SP7 and this procedure is ended.

[0059]In the case of the optical disc 3 which records the marker M by minima reeve rank processing, by this the central processing unit 15, It is made as [record / on the optical disc 3 / the output data of the host computer 2], eliminating this marker M and the continuing user data by overwrite.

[0060]The central processing unit 15 is made as [process / as usual / PMA and TOC / form and] about processing of closing etc. so that the optical disc 3 which did the packet-writing in this way can be accessed with other optical disk units.

[0061](1-2) On the composition beyond operation of a 1st embodiment, and in this optical disk unit 1, If loaded with the optical disc 3 (drawing 1), the optical pickup 9 will seek to the inner circumference side of the optical disc 3 by control of the central processing unit 15, The discrimination signal which PMA by the side of this inner circumference, PMA of record to read in area, and TOC are played, and distinguishes the kind of optical disc 3 with the reflectance of the optical disc 3 is detected. The optical pickup 9 seeks to the periphery of read out area, and the existence of the identification code which shows that it is an optical disc concerning processing of the minima reeve rank by this optical disk unit 1 to this field, and a special pattern is detected.

[0062]Thus, in the optical disk unit 1, the kind of optical disc 3 is judged and the decision result is notified to the host computer 2 by access from the host computer 2 by various information detected. The volume of the optical disc 3, capacity, etc. are notified by access from the host computer 2 if needed, and the file name etc. which were further recorded on the optical disc 3 by access of the

optical disc 3 are notified to the host computer 2.

[0063]Thus, when performing a series of processings and the command of a full blank is inputted from the host computer 2, in the optical disk unit 1. By ejecting a laser beam with the light volume at the time of elimination, and scanning PMA of the optical disc 3, read in area, and a data area sequentially from the optical pickup 9, Reference which eliminates a pit physically and from which the data of the user data recorded on the optical disc 3, PMA, and read in area is eliminated (drawing 6 (A) and (B)). When it replaces with such elimination by a user and logic elimination is specified, these processings are performed with the directions from the host computer 2 by logic elimination by rewriting of a sub-code.

[0064]On the other hand, if the command of a minima reeve rank is inputted from the host computer 2, processing of a minima reeve rank will be performed by the same elimination of PMA of the optical disc 3, and read in area. It is the identification information which shows that it is that it should be considered that is that from which the user data left by the data area was eliminated with the optical disk unit 1 at this time, The identification code or the special pattern in which it is shown that it is an optical disc concerning processing of a minima reeve rank is recorded on the periphery of the lead-out of the optical disc 3.

[0065]In the optical disk unit 1, packet writing can be started from the head of a data area on the basis of this identification information by recording the identification information which does in this way and shows the invalidity of user data. Thereby, without carrying out a full blank, even if it is an optical disc concerning processing of a minima reeve rank etc., with this optical disk unit 1, the packet-writing can be done by overwrite and that part and time which processing takes can be shortened.

[0066]By recording the marker M in which the recording start position of the continuing packet is shown in packet writing, and ending packet writing, On the basis of this marker M, even when [this] overwriting, the recording start position of the continuing packet can be detected, Time which can do the packet-writing by overwrite and the part and processing take the optical disc concerning processing of a minima reeve rank can be shortened without carrying out a full blank also by this.

[0067]Namely, in [case of the optical disc of a new article / optical disc / 3 / and the optical disc concerning a full blank] the optical disk unit 1, In the central processing unit 15 (drawing 3), for every command of packet writing. Step SP1-SP2 The procedure of -SP3-SP8-SP5-SP6-SP7 is repeated, thereby, from the head of a data area, successively, user data is recorded by a packet and packet writing is repeated.

[0068]On the other hand, in the optical disc 3 by which minima reeve rank processing was carried out with this optical disk unit 1, Procedure of step SP1-SP2-SP3-SP4-SP5-SP6-SP7 is performed, user data is recorded from the head of a data area by the command of the packet writing to begin, and the marker M is recorded on the continuing recording start position. The identification code or the special pattern recorded on the periphery of lead-out is eliminated.

[0069]In the command of the packet writing which furthermore continues or subsequent ones, The procedure of step SP1-SP2-SP3-SP8-SP5-SP6-SP7 is repeated for every command of packet

writing, The marker M is rerecorded on the end side of a data area as this recording a packet one by one from the recording position of the marker M, and corresponding to record of this packet.

[0070]In the identification code or the special pattern to write and which does in this way and is recorded on the optical disc 3 in carrying out, As compared with the number of times of packet writing, the number of times of rewriting decreases extremely by [which are once recorded by minima reeve rank processing, and is depended on subsequent packet writing] being eliminated. About the situation where the characteristic of an information storage side deteriorates by this kind of identification code, and record of a special pattern by this, and it becomes difficult to use the optical disc 3, it is fully avoidable practically.

[0071]Also in record of the marker M, what is repeatedly recorded on the same part is fully avoidable practically about the situation where the characteristic of an information storage side deteriorates by record of the marker M, and it becomes difficult to use the optical disc 3 according to a rare thing.

[0072]In practice, although based also on the processing speed of an optical disk unit, When carrying out a full blank, to requiring the processing time for about 30 to 60 minutes, in such a minima reeve rank, processing can be completed by about 1 minute and record of actual data can be started in short time at that part and this embodiment.

[0073]By recording the identification code which shows a minima reeve rank, and a special pattern on the periphery of read out area, When there is no record of TOC and PMA which are what is called open conditions, even if a system reset and disk-swapping occur, distinction of each optical disc 3 can be enabled, and it becomes possible to do the packet-writing, even if it does not carry out a full blank one by one by this.

[0074](1-3) by recording the position information on the recording start position of the block which continues by record of the marker M on an optical disc according to the composition beyond the effect of a 1st embodiment, Even when doing the packet-writing by overwrite, a continuous packet is correctly recordable, and the packet-writing can be done even if it is an optical disc applied to processing of a minima reeve rank etc. by this.

[0075]Even if it is a case where an optical disk unit of the same kind is loaded with an optical disc by recording the position information on this recording start position on an optical disc with a marker, the packet-writing can be done similarly.

[0076]By performing this marker by physical elimination of data, or logical elimination, By simple composition which only switches the control procedure by a central processing unit, even if it is an optical disc applied to processing of a minima reeve rank by change of the procedure in the host computer 2 again depending on the case, the packet-writing can be done.

[0077]By setting identification information with an identification code or a special putter to the periphery side of read out area by processing of a minima reeve rank, the validity of the information on a data area can be judged by this identification information. This eliminates recorded data [head / of a data area] by overwrite according to this identification information, and the packet-writing is done, recording position information, and the packet-writing can be done even if it is an optical disc concerning processing of a minima reeve rank.

[0078]By being recorded on an optical disc and making it become, when this identification information is recorded on an optical disc at this time and an optical disc is discharged, The packet-writing can be done even if it is the case etc. which loaded the optical disk unit of the same kind with the optical disc concerning processing of the minima reeve rank by this optical disk unit where it is used.

[0079]Once doing the packet-writing, by deleting this identification information, in subsequent processings, a recording start position can be judged and processed on the basis of the marker M recorded on the optical disc, and the packet which continues also by this can be made recordable.

[0080]Identification information can be recorded by recording identification information on the outside of read out area in this way, without affecting the format of an optical disc at all.

[0081](2) Perform record of the information on the recording start position mentioned above about a 1st embodiment, an identification code, or a special pattern in the idle time of an optical disk unit in the embodiment of ***** of the 2nd operation. In the optical disk unit concerning this embodiment, it is constituted identically to the optical disk unit 1 of a 1st embodiment except for the point that processings of the central processing unit 15 about these markers M and identification information differ by this.

[0082]If it is made to perform record of the information on the recording start position mentioned above in this way, an identification code, or a special putter in idle time, the same effect as a 1st embodiment can be acquired using effectively the processing time of the part and an optical disk unit.

[0083](3) Perform procedure of drawing 3 in the embodiment of ***** of the 3rd operation using the information which held in the memory the information corresponding to the information, the identification code, or the special pattern of the recording start position mentioned above about a 1st embodiment, and was held in this memory. When discharging the optical disc 3, according to record of a data area, the marker M and identification information are recorded on the optical disc 3. In the optical disk unit concerning this embodiment, it is constituted identically to the optical disk unit 1 of a 1st embodiment except for the point that processings of the central processing unit 15 about these markers M and identification information differ by this.

[0084]If the information corresponding to the information, the identification code, or the special putter of the recording start position mentioned above in this way is held in a memory and it is made to record if needed at the time of discharge of an optical disc, The recording rate of the part and the optical disc 3 can be lessened, the life of the spectrum disk 3 can be prolonged, and the same effect as a 1st embodiment can be acquired.

[0085](4) In the embodiment of ***** of the 4th operation, replace with the record by the side of the periphery of read out area of the identification information by the identification code or the special pattern mentioned above about a 1st embodiment, and record this identification information on PMA etc. When creating the new mode to PMA in this case and recording identification information with an identification code or a special pattern, how to record an identification code or a special pattern on disk ID further can be considered. By being the information any-eliminated, the thing which is frequency in use and which the end side of a data area records on a prescribed position for example,

it is low is also possible.

[0086]Thus, even if it records identification information on the field of other optical discs, the same effect as the optical disk unit of a 1st embodiment can be acquired.

[0087](5) In the embodiment of ***** of the 5th operation, replace with record to the optical disc 3 of information required for processing of the packet writing in a 1st embodiment, record these information on an optical disk unit, and hold it. In the optical disk unit applied to this embodiment by this, Except for the point that the processings about record of this information differ removing the point which carries out the owner of the recording device of the nonvolatile memory which records these information, a hard disk drive, etc. separately, it is constituted identically to the optical disk unit 1 of a 1st embodiment. Therefore, the composition of drawing 2 is diverted and explained in the following explanation.

[0088]Drawing 4 is a flow chart which shows the procedure of the central processing unit in the optical disk unit concerning this embodiment. If the command of a minima reeve rank is inputted from a host computer, a central processing unit will eliminate PMA and TOC, and will perform processing of a minima reeve rank. Then, a central processing unit moves to step SP12 from step SP11, and records a unique identification code on an optical disc for every optical disc. Thereby, a central processing unit records the identification code which identifies an optical disc on an optical disc, and records this identification code on the recording device of built-in nonvolatile memory, a hard disk drive, etc.

[0089]Then, a central processing unit moves to step SP13, judges the recording start position of the packet which continues here, and sets the head of a data area as this recording start position in this case. Furthermore, in step SP14 continuing, a central processing unit records the position information on the recording start position which was carried out in this way and detected on a recording device, and holds it. At this time, relate a central processing unit with the identification code of an optical disc, and it records this position information, Even when it is anew loaded with this optical disc after this processed other optical discs, it enables it to detect the recording start position of this optical disc by accessing a recording device on the basis of the identification code recorded on the optical disc. If it does in this way and position information is recorded on a recording device, a central processing unit will move to step SP15, and will end this procedure.

[0090]On the other hand, drawing 5 is a flow chart which shows the procedure of a central processing unit when the command of packet writing is inputted. If a command is inputted, a central processing unit will move to step SP22 from step SP21, and will acquire the identification code recorded on this optical disc from the information acquired at the time of charge of an optical disc.

[0091]Then, it is judged whether the identification code recorded on the recording device by moving to step SP23 and accessing a recording device on the basis of this identification code and the identification code of a central processing unit acquired from the optical disc correspond. If a negative result is obtained here, this optical disc will move to step SP24 in this case by the ability to judge that it is not that by which minima reeve rank processing was carried out with this optical disk unit. A central processing unit detects here the field (it is a field concerning the field or logic elimination

eliminated physically) where data is not recorded effectively one by one from the head side of a user area.

[0092]In step SP25 continuing, a central processing unit judges whether the field where data is not effectively recorded by processing of step SP24 has been detected. By the ability to consider the case where the recordable field does not remain in this optical disc in this case etc. if a negative result is obtained here, a central processing unit moves to step SP26, and processing to the optical disc which cannot be written in is performed. This processing is processing of returning the status of an error to a host computer to the command of packet writing, and notifying the contents of the error here. Thus, if it writes in and processing to an impossible optical disc is performed, a central processing unit will move to step SP27, and will end this procedure.

[0093]On the other hand, if an affirmation result is obtained by step SP25, a central processing unit will move to step SP28, and the head position of the field detected by step SP24 will be set as a recording start position. Then, it moves to step SP29 and the packet-writing is done from the head position which was carried out in this way here and detected. Then, a central processing unit moves to step SP30, and calculates the recording start position of the continuing packet writing. Here, the recording start position of the continuing packet is set up follow the end of the packet recorded by step SP29.

[0094]Thus, if the continuing recording start position is calculated, a central processing unit will move to step SP31, and will record the position information by this recording start position on a recording device. When the identification code with a central processing unit unique to this optical disc is not set up in this case, this identification code is recorded on an optical disc. About a recording device, it relates with the identification code of an optical disc, and position information is recorded. A central processing unit moves to step SP32 continuously, and if it judges whether all the data was recorded here and a negative result is obtained, it will move to step SP22.

[0095]On the other hand, if an affirmation result is obtained by step SP23, a central processing unit moves to step SP33, it will acquire the corresponding position information recorded on the recording device, will set up a recording start position by this position information, and will move to step SP29.

[0096]The optical disc which carried out the full blank of the central processing unit, for example with other optical disk units by this, About the optical disc which carried out the full blank with this optical disk unit, and the optical disc which is not yet performing blank processing. Step SP22-SP23-SP24-SP26 Procedure of -SP28-SP29-SP30-SP31-SP32 is performed, and the output data of a host computer is recorded from the head of a data area, or the end of recorded data. The position information on the recording start position which continues at this time is recorded on a recording device, and is held. Procedure of step SP22-SP23-SP33-SP29-SP30-SP31-SP32 is performed continuously, and processing of packet writing is performed one by one on the basis of the position information which this recorded on the recording device. In processing of step SP22-SP23 once a central processing unit records data in this way, Without accessing to the optical disc 3, a memory is accessed on the basis of the identification code which was acquired a priori, was held, or was recorded on the optical disc 3 and held, and an identification code is judged.

[0097]On the other hand, about the optical disc by which minima reeve rank processing was carried out with this optical disk unit. Step SP22-SP23 Procedure of -SP33-SP29-SP30-SP31-SP32 is performed, and processing of packet writing is performed one by one by the position information on the recording start position recorded on the recording device.

[0098]Even if it records position information on a different recording device from an optical disc like this embodiment, the same effect as a 1st embodiment can be acquired. When it records on a different recording device in this way from an optical disc, the part and access time can be shortened by position information being acquirable in a short time as compared with the case where it records on an optical disc.

[0099](6) When the position information which shows a recording start position with the identification information which shows processing of a minima reeve rank in other embodiments in addition the above-mentioned 1st - a 4th embodiment was recorded, described the case where only position information was recorded and held in a 5th above-mentioned embodiment, but. When recording these information not only on this but on an optical disc, it may be made for this invention to record only position information, and when recording these information on a recording device conversely different from an optical disc, it may be made to record position information and identification information with this.

[0100]Although the case where recorded identification information after a minima reeve rank, and the position information which shows the continuing recording start position after packet writing was recorded was described, it may be made for this invention to record position information and identification information not only just before this but just before each processing in an above-mentioned embodiment.

[0101]Although the case where position information was recorded on the optical disk unit connected to the host computer in a 5th above-mentioned embodiment was described, It may be made for this invention to record these information on the computer which could record not only this but position information on the host computer, and was connected with the host computer by the Local Area Network etc., and the optical disk unit further connected to this computer. In addition to the device relevant to such an optical disc, the mechanism of an IC card is embedded, for example in an optical disc or the case of an optical disc, and it may be made to record these information on the mechanism of this IC card.

[0102]Although the case where the position information by a marker was recorded on an optical disc by formation of a non-record section was described, it may be made for this invention to record the position information by a marker by record of not only this but a special pattern, a special code, etc. in the above-mentioned 1st - a 4th embodiment.

[0103]In an above-mentioned embodiment, although the case where user data was recorded with packet writing was described, this invention can be widely applied, when recording desired data not only by this but by overwrite.

[0104]In an above-mentioned embodiment, although the case where this invention was applied to the optical disk unit of CD-RW was described, this invention is widely applicable to the optical disk unit

which accesses various optical discs in which not only this but record reproduction is possible.

[0105]

[Effect of the Invention]By recording the position information on the recording start position of the continuing block on a predetermined recording device, and holding it according to this invention, as mentioned above, When erasing processing to which it is supposed as a premise of such processing that record of the data area was eliminated by elimination of the data of a management domain is performed, Packet writing etc. can be carried out even if it is an optical disc applied to processing of a minima reeve rank etc. by setting up predetermined identification information and starting processing of writing by this identification information.

[Translation done.]

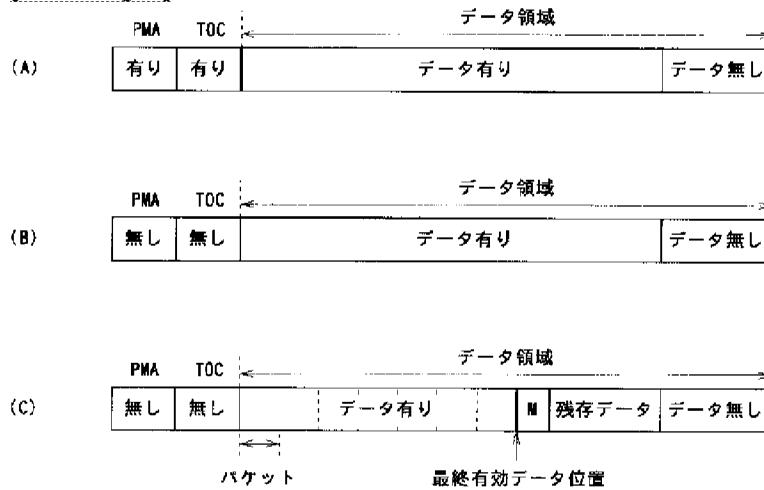
* NOTICES *

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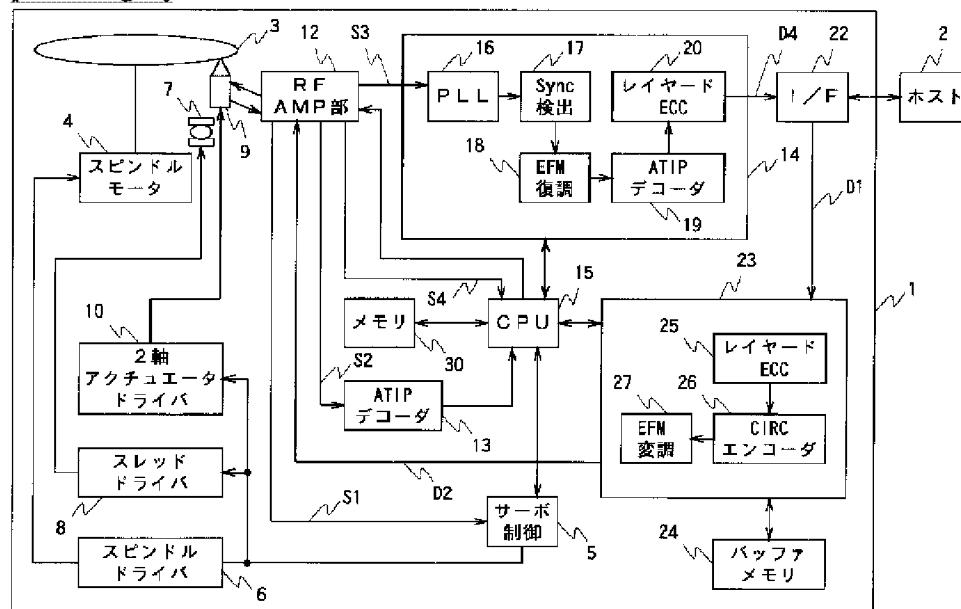
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

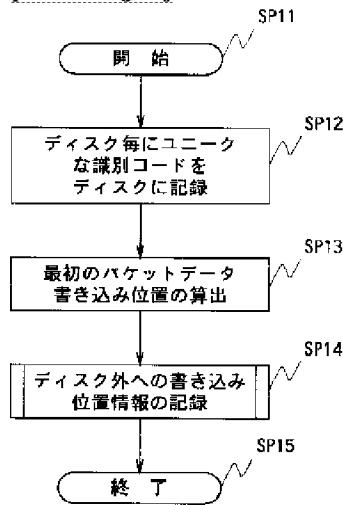
[Drawing 1]



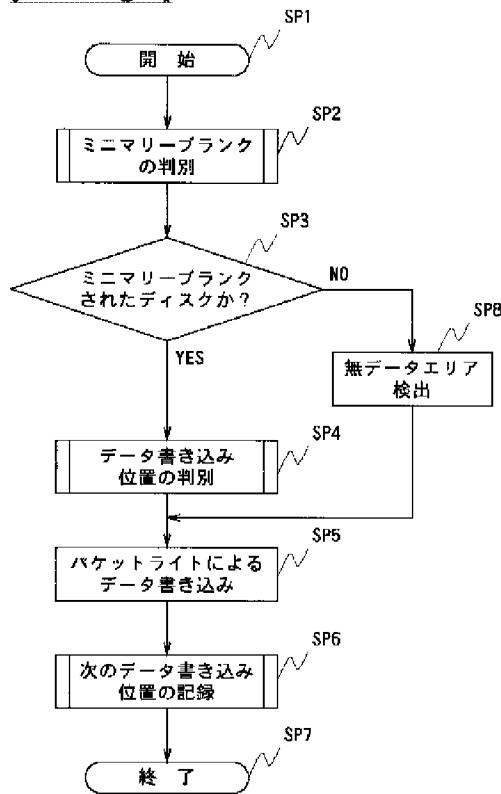
[Drawing 2]



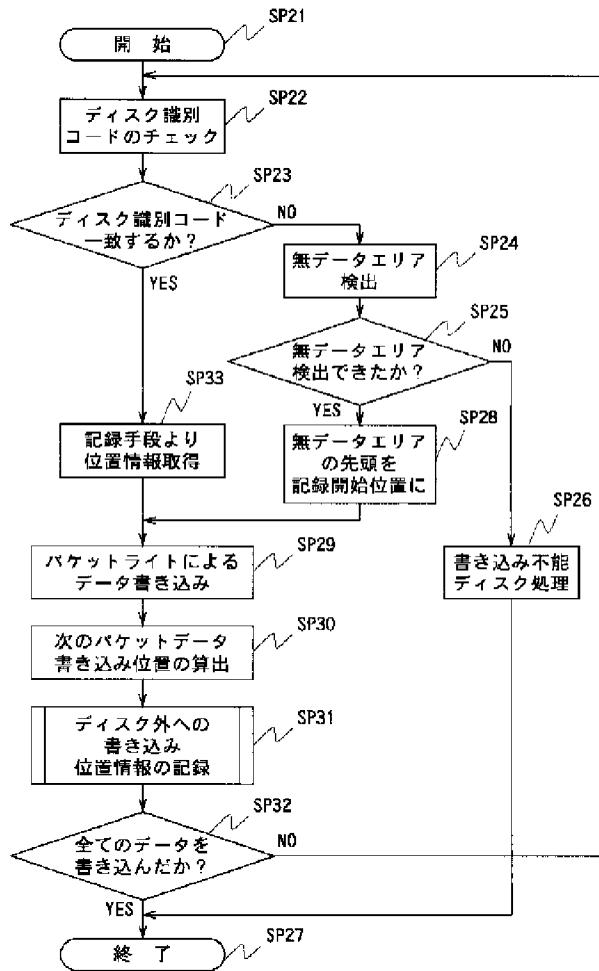
[Drawing 4]



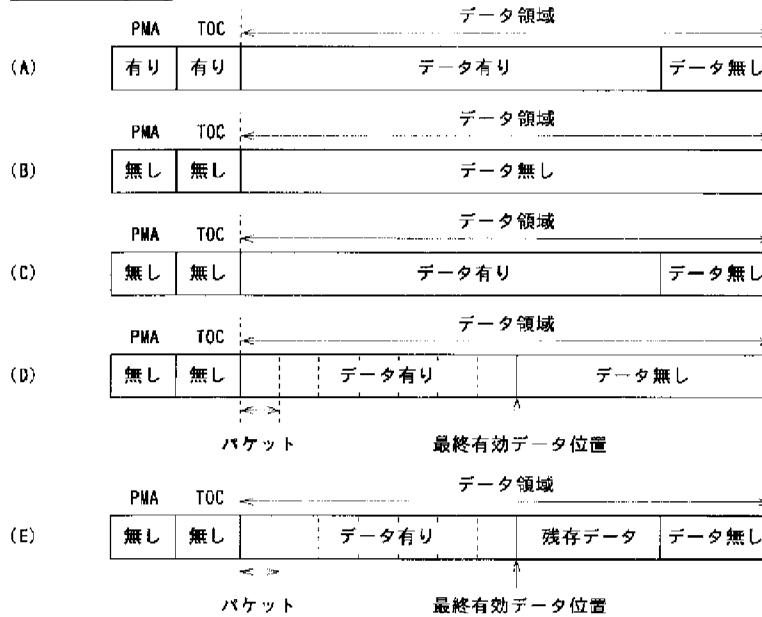
[Drawing 3]



[Drawing 5]



[Drawing 6]



[Translation done.]